Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April/May– 2017**

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| **Code :** | **16AE2002** | **Duration :** | **3hrs** |
| **Sub. Name :** | **AIRCRAFT STRUCTURES-I** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| Q. No. | Questions | Course  Outcome | Marks |
| 1. | Using the method of virtual work, find the vertical deflection component of point E of the truss shown in figure. Cross-sectional areas of members are: AE and FD = 250 mm2 ; EF and EC = 1875 mm2 ; AB, BC, CD, EB and FC =1250 mm2 ; Young’s Modulus E = 200 kN/mm2 . | CO2 | 20 |
| (OR) | | | |
| 2. | A continuous beam ABCD is simply supported over three spans of 6 m, 5 m, and 4 m, respectively. The beam carries point loads of 90 kN and 80 kN at 2 m and 8 m from the support A and a uniformly distributed load 30 kN/m over the span CD. Find the moments along the beam and the reactions at the supports. Also draw the bending moment and shear force diagram using three moment method. | CO2 | 20 |
| 3. | A continuous beam ABCD is fixed at A and simply supported at B, C and D. The Span AB is 5 m and carrying a point load of 40 kN at a distance 2 m from A. The span BC is 4 m and carries a uniformly distributed load of 10 kN/m. The span CD is 4 m and carrying a point load of 30 kN at a distance 1.5 m from C. Sketch the bending moment and shear force diagram by using method of moment distribution. | CO2 | 20 |
| (OR) | | | |
| 4. | Derive the Euler’s crippling load for a column when it has (i) both ends fixed and (ii) one end fixed & other end free. | CO1 | 20 |
| 5. | A blot is under an axial thrust of 9.6 kN together with a transverse force of 4.8 kN.Calculate its diameter according to:   1. Maximum Principal stress theory 2. Maximum shear stress theory 3. Strain energy theory   Given: Factor of safety = 3, Yield strength of material of bolt = 270 N/mm2, Poisson’s ratio = 0.3. | CO3 | 20 |
| (OR) | | | |
| 6. | The cross-section of a beam has the dimensions shown in figure. If the beam is subjected to a negative bending moment of 100 kN-m applied in a vertical plane (i.e. MX = -100 kN-m), Calculate the maximum direct stress in the stating clearly the point at which it acts | CO2 | 20 |
| 7. | An equal angle section with side 20 cm thickness 2 cm is subjected to moments Mx = 20kN-m and My = 15 kN-m. Find the maximum tensile and compressive stresses. | CO2 | 20 |
| (OR) | | | |
| 8. | Derive the general stress-strain relationship equation for Three-Dimensional body. | CO3 | 20 |
| **Compulsory:** | |  |  |
| 9. | Briefly explain the different types of composite material used in Aircraft construction and explain the composite laminate manufacturing methods. | CO3 | 20 |

ALL THE BEST